Sustainable Seas Expeditions

Cruise Plan

April 12, 1999

Cordell Bank National Marine Sanctuary
Fort Mason, Building 201
San Francisco, CA 94123
ph. (415) 561-6622
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CRUISE INSTRUCTIONS: Final

NOAA Ship: McARTHUR Cruise Number: AR-99-03

Cruise Title: Sustainable Seas Expeditions

Study Area: Cordell Bank National National Marine Sanctuary
Date: April 27 - May 6, 1999
Sponsoring Institution: NOAA's National Ocean Service (NOS), Cordell Bank National Marine Sanctuary, Sustainable Seas Expedition (SSE), National Geographic Society (NGS), Richard and Rhoda Goldman Fund

Cruise Description and Objectives: The primary objective during the first year of the Sustainable Seas Expeditions (SSE) will be to survey the top of Cordell Bank and assess habitats, algae, invertebrate, and fish populations. A second objective during the survey effort will be to investigate fishing impacts on the Bank. This data will also be used to develop educational and outreach materials for the Sanctuaries. In addition, the Sanctuary and the National Ocean Service (NOS) will use this unique opportunity to increase public awareness and appreciation for our nation's Marine Sanctuaries and the work of the National Ocean Service (NOS). This will be accomplished through a student summit and a major environmental faire and media event.

The primary goal of the Ecosystem Dynamics Study (EDS) is to continue a long term monitoring project investigating relationships between hydrographic features and the distribution and abundance of marine organisms particularly the euphausiid shrimp or krill.

Synopsis of Scientific Measurements:
Sampling will consist of a series of video and visual transects completed over predetermined areas. The initial effort will focus on the upper portions of Cordell Bank with depth stratified sampling in the northern, central and southern portion of the Bank. Abundance and distribution data for algae, invertebrates and fishes collected during this phase of the project will help direct future sample design. Descriptive evaluations of prominent pinnacles or other bottom features will establish a baseline to assess change over time. The EDS will measure water column parameters with Seacat and sample plankton at discreet depths with a Tucker trawl and Manta net.

Sustainable Seas Expedition

- Use the DeepWorker to complete video transects characterizing habitats, benthic algae and invertebrate communities

- Estimate distribution and abundance of fishes with video and visual transects using DeepWorker
- Collect information and images to be used in media, education and outreach efforts
- Visually assess fishery impacts on Cordell Bank habitats and document with video and still cameras

Ecosystem Dynamics Study

- Measure physical attributes of the water column to characterize distinct hydrographic features particularly those associated with Cordell Bank and Bodega Canyon
- Identify diel distribution and abundance patterns of phytoplankton and zooplankton
- During daytime sampling, complete visual transects to assess distribution and abundance of seabirds and marine mammals while transiting between plankton stations

Chief Scientist: SSE: Sylvia Earle
alternate - Francesca Cava
EDS: Dan Howard

1.0 <u>ORGANIZATIONAL STRUCTURE</u> - *(Definition of specific roles/ responsibilities are currently being negotiated and will be forwarded to you)*

<u>1.1 STRUCTURE</u>

- *Commanding Officer* - Final approval authority for all operations. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched.

- *Dive Supervisor* - Responsible for the procedures and coordination of all dive operations. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched.

- *Chief Scientist* - Responsible for collaborating with the CO, Dive Supervisor, and Mission Coordinator to implement the Cruise Plan and to develop the "Plan of the Day" (POD). The Chief Scientist has decision-making authority for any departures from the schedule, planned activities, or personnel.

- *Mission Coordinator* – Responsible for collaborating with the CO, Dive Supervisor, and Chief Scientist to implement the Cruise Plan and to develop the POD. The Mission Coordinator is also responsible for organizing and overseeing the processing, storage, and transmittal of data and information collected during submersible dive operations.

- *Principal Investigator* - Responsible for the individual project content.

- *Pilot* - Certified DeepWorker pilot approved for the specific mission dive.

- *Mission Log Coordinator* – Responsible for compiling the Mission Log for the NGS SSE Web site.

<u>1.2 PROTOCOL</u>

Dive Authority – The Commanding Officer and the Dive Supervisor will make the final decision on dive operations.

Project implementation – The CO, Dive Supervisor, Chief Scientist, Mission Coordinator, and other required personnel will develop the POD based on the Cruise Plan. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched, while the Chief Scientist has decision-making authority for any departures from the schedule, planned activities, or personnel.

2.0 OVERVIEW OF OPERATIONS

In April of 1998 NOAA entered into a five year cooperative project with the National Geographic Society to explore the nation's 12 National Marine Sanctuaries. As part of this effort, called the Sustainable Seas Expedition (SSE), Cordell Bank National Marine Sanctuary (CBNMS) will be using the R.V. McARTHUR to complete field studies from 27 April to 06 May, 1999. During daytime hours, scientists and educators will be operating a one person autonomous submarine called the DeepWorker to survey the top of Cordell Bank and assess algae, invertebrate and fish populations. A second project will survey for fishery impacts on Cordell Bank habitats. At night and when sea conditions preclude sub operations, scientists will conduct plankton tows and Seacat casts at established sampling locations. This work is part of a long term monitoring effort investigating ecosystem dynamics. Educational and promotional events will occur during the cruise to complement the exploration and research activities.

3.0 ITINERARY

Pilots on board - Dan Howard (DH), Ed Ueber (EU), Jan Roletto (JR), Tom Laidig (TL), Maria Brown (MB), and Natalie Cosentino (NC).

APRIL

27 0530 Proceed to Drake's Bay for launch and recovery exercise for new pilot (NC)
0600 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
0730-0930 Launch and recovery exercise
1000 Depart Drake's Bay for Cordell Bank
1400-1600 Project 1, Dive 1
1930 When DeepWorker operations are complete, proceed to EDS site - plankton work and Seacat casts

28 0530 on station at Cordell Bank for CBNMS dives
0600 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
0730-0930 Project 1, Dive 2
1100-1200 Project 1, Dive 3
1430-1630 Project 1, Dive 4
1930 When DeepWorker operations are complete, proceed to EDS site - plankton work and Seacat casts

29 0530 on station at Cordell Bank for CBNMS dives
0600 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
0730-0930 Project 2, Dive 1

1200-1330 Project 3, Dive 1
1530-1700 Project 3, Dive 2
1930 When DeepWorker operations are complete, proceed to EDS site - plankton work and Seacat casts

30 0530 on station at Cordell Bank for CBNMS dives
0600 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
0730-0930 Project 3, Dive 3
1100-1230 Project 1 , Dive 5
1430-1600 Project 2, Dive 2
2100 When DeepWorker operations are complete, proceed to pier 32 in San Francisco for in port day

May

01 All Day - In Port

02 0600 Depart Pier 32 for Cordell Bank
0800 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
1100-1230 Project 1, Dive 6
1400-1600 Project 1, Dive 7
2100 When DeepWorker operations are complete, proceed to pier 32 in San Francisco for in port day

03 0530 on station at Cordell Bank for CBNMS dives
0600 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
0730-0900 Project 1, Dive 8
1030-1230 Project 2, Dive 3
1430-1630 Project 1, Dive 9
1930 When DeepWorker operations are complete, proceed to EDS site - plankton work and Seacat casts

04 0530 on station at Cordell Bank for SSE dives
0600 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
0730-1000 Project 4, Dive 1
1230-1430 Project 4, Dive 2
1930 When DeepWorker operations are complete, proceed to EDS site - plankton work and Seacat casts

05 0530 on station at Cordell Bank for SSE dives
0600 Pre-dive meeting in wardroom - Mission Coordinator (MC), Dive Officer (DO), Pilots (P), Ship's Officers (SO), Chief Scientist (CS), Nuytco staff person (NS)
0730-1000 Project 4, Dive 3

1200-1430 Project 4, Dive 4
1930 When DeepWorker operations are complete, proceed to Pier 32

06 In Port all day (McARTHUR in port day, SSE Contingency Day**)**
07 In Port all day
08 McARTHUR Open House - ship open 1200 - 1600 hrs. Environmental Faire on dock 1000 -1700 hrs. McARTHUR sails for Monterey after open house. Monterey cruise plan starts here

4.0 PROJECT DESCRIPTIONS

Project descriptions can only be considered a guide as to how the Chief Scientist and Principal Investigators expect the projects to progress without being able to predict the weather, operational of transects, sites, and stations.
The McARTHUR is scheduled for consecutive legs in the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries. This schedule allows flexibility in contingency planning for both Sanctuaries. Weather and sea conditions will drive the following prioritized operations. Operations on Cordell Bank will have top priority if weather conditions are workable. When conditions start to deteriorate at Cordell, the first alternative will be deployment in the lee of the Farallon Islands. If this is not possible, the next option will be deployment of the DeepWorker in Drake's Bay. If conditions prevent deploying the submarine, we will begin hydrographic and biological sampling at established sampling locations in the Gulf of the Farallones and around Cordell Bank.

4.1 PROJECT DIVES

Project Dive #1
Principal Investigator: Dan Howard
Objective: Characterize habitat, assess invertebrate and fish assemblages on Cordell Bank
Task: Conduct video and visual transects, take still photographs

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration (hrs)
1	Ed Ueber	middle ground Cordell Bank	180	180	2
2	Dan Howard	middle ground Cordell Bank	180	180	2
3	Jan Roletto	middle ground Cordell Bank	180	180	1
4	Tom Laidig	middle ground Cordell Bank	180	180	2
5	Jan Roletto	southeast corner Cordell Bank	240	240	1.5
6	Maria Brown	middle ground Cordell Bank	180	180	1.5
7	Amber Mace	middle ground Cordell Bank	180	180	2.0

8	Karina Racz	middle ground Cordell Bank	180	180	1.5
9	Ed Ueber	southeast corner Cordell Bank	240	240	2

Currents could be a potential safety concern and possibly entanglement from fishing gear.
Alt Site: Farallon Islands, 180 feet, Contingency site - Drake's Bay, 70 feet
Equip Sub: 35mm still and video camera systems, paired laser, positioning system
Equip Ship: none

Project Dive #2
Principal Investigator: Natalie Cosentino
Objective: Document flora and initiate species list for algae on Cordell Bank
Task: Conduct video and visual transects, take still photographs, and collect unidentifiable algae if possible

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration (hrs)
1	Natalie Cosentino	middle ground Cordell Bank	180	180	2
2	Natalie Cosentino	middle ground Cordell Bank	180	180	1.5
3	Natalie Cosentino	middle ground Cordell Bank	180	180	2.0

Currents could be a potential safety concern and possibly entanglement from fishing gear.
Alt Site: Farallon Islands, 180 feet, Contingency site - Drake's Bay, 70 feet
Equip Sub: 35mm still and video camera systems, paired laser, positioning system
Equip Ship: standard

Project Dive #3
Principal Investigator: Dan Howard
Objective: Investigate fishing effects on hard bottom substrates at Cordell Bank
Task: Conduct surveys to investigate potential negative impacts of fishing on Cordell Bank. Use video and still photographs to document lost gear or damaged habitat.

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration (hrs)
1	Ed Ueber	northwest edge Cordell Bank	280	280	1.5
2	Dan Howard	northwest edge Cordell Bank	280	280	1.5
3	Tom Laidig	northwest edge Cordell Bank	280	280	2.0

Currents, entanglement, and proximity to deep water are potential safety concerns for these dives
Alt Site: Farallon Islands, 180 feet, Contingency site - Drake's Bay, 70 feet
Equip Sub: 35mm still and video camera systems, paired laser, positioning system

Equip Ship: standard

Project Dive #4
Principal Investigator: Sylvia Earle
Objective: Sylvia's first dive would attempt to locate anchor lost by Edward Cordell during his first survey visit to the Bank in 1869. Remaining dives are for exploration and to photo document biological resources on Cordell Bank and the DeepWorker operating over the Bank
Task: Record images with video and still photographs

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration (hrs)
1	Sylvia Earle	west edge Cordell Bank	280	280	2.5
2	Kip Evans	middle ground Cordell Bank	180	180	2
3	Sylvia Earle	northwest edge Cordell Bank	300	300	2.5
4	Kip Evans	middle ground Cordell Bank	180	180	2.5

Alt Site: East Landing, SEFI, 280 ft., Contingency site - Drakes Bay, 70 ft
Equip Sub: 35mm still and video camera systems
Equip Ship: Divers on stand-by, dive plan for emergency rescue operations
Special Consideration: On the first of Kips dives a second sub operated by Nuytco pilot would be put in the water to get underwater images of DeepWorker over Cordell.

4.2 OTHER PROJECTS - These are projects related to the cruise, but do not involve dive operations. Examples include open houses, media events, etc. Please use the following format to provide information on these projects:

Event Name: McARTHUR open house and environmental faire
Purpose: Spotlight work of Sanctuaries, NOS and SSE
Location: Pier 1, San Francisco
Primary Participants: Sylvia Earle (if available), media, Environmental groups, and the public
Date and Time: Saturday, May 8, 1999. McARTHUR open for tours 1200-1600hrs. Environmental faire will run from 1100-1700hrs on the pier.
Alternative Date and Time: none
Specific Request from Ship: Be ready for Open House. May be interview requests for officers.

4.3 Additional Projects

4.3.1 These are projects related to the cruise, but not to SSE. Such projects are to be conducted at night or during extended down times of the SSE:

Project: Ecosystem Dynamics Study
Principal Investigator: Dan Howard
Objective: With upwelling conditions in spring, four distinct water masses are present around Cordell Bank and in the Gulf of the Farallones. With hydrographic and

biological sampling we want to investigate the relationship between these different water types and the distribution and abundance of organisms.
Task: Seacat casts, manta tows, tucker trawls
Location: Appendix B
Alt Site: none
Equip Ship: starboard hydro winch, inclinometer, niskin bottle
Equip Scientific Party: Sampling equipment

Project: Lingcod tagging project
Principal Investigator: Tom Laidig
Objective: Investigate seasonal and annual movements of lingcod
Task: Catch, tag and release lingcod
Location: Cordell Bank
Alt Site:
Equip Ship: none
Equip Scientific Party: Sampling equipment

5.0 OPERATIONAL PLANS

The following operational plans can only be considered a guide as to how the Chief Scientist expects the project to progress without being able to predict the weather, operational and scheduling problems, and equipment failures. Appendix A will list geographical positions of transects, sites, and stations.

5.1 SSE PROJECTS

5.1.1 Project dives 1 and 3 are part of a characterization study that can be used to compare productivity between the NW, middle, and SE sections of the Bank. Once on the bottom, a series of 10 minute transects will be conducted along predetermined courses. Transects will be punctuated every ten minutes by life support checks with Nuytco personnel. The final 20 minutes of each dive are unstructured allowing pilots to explore and document interesting features in the area. Project dive 2 will be focused on describing the algae on Cordell Bank for the first time. Assessments will describe species composition and depth distributions as the DeepWorker moves from shallow to deep water. Project dive 3 will search for and document any negative impacts from fishing observed on Cordell Bank's rocky reef habitat. DeepWorker will be deployed in the northwest portion of the Bank and transects will be run to systematically survey this area of the Bank. Video and still photographs will be used to document any damage observed. Project dive 4 will be dedicated SSE exploration and to documenting DeepWorker operations. Sylvia Earle's recommended first dive will be to locate the anchor lost by Edward Cordell during his first survey of the Bank in 1869. Due to the depth of Cordell Bank, we are requesting that both subs be deployed to document DeepWorker operations on Cordell Bank. Kip Evans, the NGS photographer would pilot one of the subs and a Nuytco representative would operate the second sub.

5.2 ADDITIONAL PROJECTS

Ecosystem Dynamics Study
During the course of the cruise, we will be sampling a grid 16 stations over Cordell Bank. The grid extends from north of Bodega Canyon to the southern part of the Bank. The ADCP and thermosalinograph will run continuously during the cruise. An AVHRR satellite image of sea surface temperature will be downloaded each day, or as cloud cover allows, from the CoastWatch group in La Jolla, CA.
One complete pass of the 16 stations (Appendix B) will take approximately 30 hrs. Operations will be conducted at night and opportunistically during daylight hours. Daytime

operations will depend on the DeepWorker schedule and sea conditions. At each station, the sampling will consist of a Seacat cast, a 15 minute surface manta net tow and a Tucker trawl. The Tucker trawl will be sent to depth (max 120m) and retrieved at 10 meters per minute. At a predetermined depth, a messenger will be sent down the wire to close one net and open a second net. There will be two discreet samples, a deep and a shallow, from each Tucker trawl. Ship speed will be maintained at 1.5 - 2.0 kts while towing the manta net, at the speed necessary to maintain wire angle at 45 degrees for the Tucker trawl (2-3 kts), and stationary for the Seacat casts. Water samples will be taken periodically with a Niskin bottle attached to the Seacat wire for post cruise calibration of the Seacat. Seabird and marine mammal surveys will be conducted on transects between sampling stations during daylight hours. During transects, the ship will hold a steady speed of 8 to 10 knts.

Lingcod Tagging Project: Cordell Bank is the primary destination for Bodega Bay party boats fishing for lingcod. When the DeepWorker is not in the water, we would like to collect lingcod (*Ophiodon elongatus*) with hook and line. After each fish is brought on board we would record the location caught, size and sex of each individual before tagging and returning to the sea. Tags would be visible and have a unique configuration so individuals could be identified when observed from the DeepWorker. This could provide important information on seasonal and annual movements of lingcod on Cordell Bank. This data could then be used to better manage this important species.

6.0 CONTACT PERSONNEL

Scientific Operations:

Cordell Bank
National Marine Sanctuary
Dan Howard
Fort Mason, Bldg 201
San Francisco, CA 94123
Ph. (415) 561-6622

Chief Scientist -Sylvia Earle
alternate - Francesca Cava

Ship Operations:

NOAA Pacific Marine Center
LT Dana Wilkes
1801 Fairview Ave, E.
Seattle, WA, 98102
Office - 206-553-4548 Fax - 206-553-1109

7.0 SCIENTIFIC PERSONNEL

7.1 The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of personnel or the ship (2) exceed the time allotted for the cruise (3) result in undue additional expense or (4) change the general intent of the project.

7.2 PARTICIPATING SCIENTISTS

Date* - *include dates if not aboard for entire project.

Name	Gender / Nationality	Position	Organization	Date
Daniel Howard	M / USA	Mission Coord.	CBNMS	Apr27-May6
Ed Ueber	M / USA	Pilot	GFNMS	Apr27-May6
Natalie Cosentino	F / USA	Pilot	volunteer	Apr27-May6
Maria Brown	F / USA	Pilot	FMSA	May2-May6
Tom Laidig	M / USA	Pilot	NMFS	Apr27-30
Jan Roletto	F / USA	Pilot	GFNMS	Apr27-30
Karina Racz	F / USA	Pilot	FMSA	May2-6
Amber Mace	F/ USA	Pilot	FMSA	May2-6
Peter de Jung	M / USA	Plankton	volunteer	Apr27-May6

7.3 PARTICIPATING TECHNICIANS

NAME	Gender/Nationality	Project	Organization	Date*

7.4 OTHER PERSONNEL

7.5 MEDICAL FORMS

All personnel participating on board will complete a NOAA health Services Questionnaire prior to embarking on the vessel. Forms will be completed and submitted to the Commanding Officer per NOAA Corps Instruction 6000.

8.0 DATA RESPONSIBILITIES

8.1 DATA AND SAMPLES

8.1.1 The Chief Scientist via the Mission Coordinator is responsible for the data quality, disposition, and archiving of data and samples collected aboard the ship for the primary project. As the representative of the cruise sponsor, the Chief Scientist is also responsible for the dissemination of copies of these data to participants on the cruise and to any other requesters.

8.1.2 The Commanding Officer will give the acting Chief Scientist a single copy of all data collected by ship's personnel. The ships Scientific Computer System (SCS) will collect data continuously during the project. The SCS data will be provided to the Chief Scientist at the completion of the project. The Chief Scientist will provide the Commanding Officer a list of all data collected by the scientific party.

8.1.3 the Commanding Officer is responsible for all data collected for ancillary projects until those data have been transferred to the projects' Principal Investigator.

8.2 RECORDS AND REPORTS

8.2.1 Marine Operations Abstract (MOA). McARTHUR's officers will maintain the MOA during the cruise. The ship's position will be entered for all operations, and otherwise every 30 minutes or when changing course or speed. The Commanding Officer will give the Mission Coordinator a copy of the MOA at the completion of the project.

8.2.2 Pre Dive forms will be used to check out the sub prior to each dive and are the responsibility of the pilot and dive crew. Pre Dive forms will be signed by the Dive Supervisor.

8.2.3 Dive Logs will be used to keep track of the subs performance during each dive and are the responsibility of the Dive Supervisor or designee.

8.2.4 The Mission Coordinators Log will provide an accounting of the project work being conducted during each dive and are the responsibility of the Mission Coordinator.

8.2.5 The Mission Log will be based on a compilation of materials collected during dive operations (audio, video, photographs) and information collected post-dive (text provided by pilots), and will be posted on the NGS SSE Web site. The Mission Log is the responsibility of the Mission Log Coordinator.

8.2.6 The Mission Coordinator will complete the Ships Operations Evaluation Form and forward to the Office of NOAA Corps Operations.

8.2.7 All film collected during the cruise will be handled in accordance with the MOU between NOAA and NGS.

9.0 EQUIPMENT LISTS

9.1 SUPPLIED BY THE SCIENTIFIC PARTY:

(a) manta net
(b) Tucker trawl with sliding messengers for 1/4" wire
(c) flow meters for plankton nets (2)
(d) SeaBird SBE19 Seacat with Wetstar fluorometer
(e) sample jars (quart mason)
(f) formalin with MSDS
(g) Alcohol 95% Etoh with MSDS
(h) Microscope, dissecting equipment, sample supplies
(i) salinity bottles
(j) chemical spill clean up kit
(k) Time depth recorder
(l) sample sieves and buckets
(m) spotting scopes and binoculars
(n) computers

9.2 SUPPLIED BY THE McARTHUR:

(a) A frame and winch with 1/4 or 3/16 diameter wire
(b) starboard hydro winch
(c) inclinometer
(d) EQ-50 depth sounder with wiring to connect to VCR
(e) thermosalinograph interfaced with computer and GPS
(f) ADCP configured and interfaced with computer
(g) freezer space for one dozen water samples (one quart jar = sample)
(h) position logs
(i) bathymetric and navigation equipment
(j) daily satellite image of sea surface temperature
(k) Niskin bottle and clamps for starboard hydro wire

9.3 SUPPLIED BY NUYTCO

(a) two DeepWorker submarines

(b) 3 people for technical assistance

(c) necessary equipment and supplies to keep subs operational

10.0 ANCILLARY PROJECTS

10.1 ANCILLARY PROJECTS: Ancillary projects are secondary to the objectives of the cruise, should be treated as additional investigations, do not have representation aboard, and are accomplished by the ship's force.

10.2.1 Ancillary tasks will be accomplished in accordance with the NOAA Fleet Standing Ancillary Instructions.

11.0 MISCELLANEOUS

11.1 Navigation Control: Shipboard DGPS provided for vessel. Submersible navigation provided by NUYTCO

11.2 Required Compliance: The Chief Scientist will require each Mission Coordinator to contact local authorities to increase the safety and awareness of the operations. These authorities include :

11.2.1 US Coast Guard Station responsible for the area of coverage in the cruise instructions.

11.2.2 Local Notice to Mariners in the district concerning the area covered in the cruise instructions.

11.2.3 Port Authority or Harbor master for potential dive sites.

11.3 Meals for all scientific party members will charged to the host organization in accordance with NOAA Administrative Order 203-100. The Chief Scientist will provide the Commanding Officer with the appropriate accounting codes.

11.4 Pre-Cruise Meeting: A pre-cruise meeting between the Chief Scientist, the Commanding Officer, the Mission Coordinator, and the Dive Supervisor will be held prior to the commencement of operations to do a final review of the cruise plan.

11.5 Post-Cruise debrief: A post-cruise debriefing between the Chief Scientist, the Commanding Officer, the Mission Coordinator, the Dive Supervisor, and the Mission Coordinator for the next site will be held to review any problems that occurred.

11.6 HAZMATS - MSDS will be provided for three gallons of Formalin and one gallon of Ethel Alcohol brought on board

12.0 COMMUNICATIONS

12.1 McARTHUR will communicate daily, Monday through Friday, with the Pacific Marine Center. Normally this will be via email message, but radio contact will be maintained when possible.

12.2 Because the scientific staff must sometimes communicate with other research vessels, commercial vessels, and shore-based NOAA facilities, the Chief Scientist or his designee may request the use of radio transceivers aboard the vessel.

12.3 McARTHUR is equipped with INMARSAT and cellular telephone. The Chief Scientist may need access to these systems with permission from the Commanding Officer. The Commanding Officer will provide the Chief Scientist with a log of all calls made from the ship by the scientific party at the completion of the project.

13.0 APPENDICES

(A):

List of Coordinates for tracklines or stations.

Starting positions for DeepWorker Assessments

Project #1 - Habitat Characterization Cordell Bank

dive#1	38° 00′ 00″ N	123° 26′ 00″ W	middle ground
2	38° 01′ 05″ N	123° 26′ 00″ W	middle ground
3	38° 00′ 30″ N	123° 25′ 30″ W	middle ground
4	38° 01′ 30″ N	123° 24′ 45″ W	middle ground
5	37° 58′ 30″ N	123° 24′ 30″ W	southeast bank
6	38° 00′ 30″ N	123° 26′ 15″ W	middle ground
7	38° 01′ 15″ N	123° 26′ 15″ W	middle ground
8	38° 00′ 30″ N	123° 25′ 15″ W	middle ground
9	37° 58′ 30″ N	123° 24′ 30″ W	southeast bank

Project dive #2 - Algae Assessment

1	37° 59′ 30″ N	123° 25′ 00″ W	high spot southwest bank
2	38° 01′ 45″ N	123° 25′ 00″ W	high spot mid east bank
3	38° 03′ 45″ N	123° 28′ 45″ W	high spot northwest bank

Project dive #3 - Fishing Effects

1	38° 03′ 30″ N	123° 28′ 00″ W	northwest bank
2	38° 02′ 30″ N	123° 27′ 00″ W	northwest bank
3	38° 02′ 30″ N	123° 27′ 00″ W	northwest bank

Project #4 - Exploration and Photo Documentation

1	38° 00′ 30″ N	123° 26′ 00″ W	west bank - Cordell's anchor
2	37° 59′ 00″ N	123° 25′ 30″ W	high spot southwest bank
3	38° 03′ 45″ N	123° 28′ 45″ W	northwest edge bank
4	38° 01′ 15″ N	123° 26′ 15″ W	middle ground

(B):

Positions for Cordell Bank EDS Sampling:

38 14.5	123 32.5
38 14.5	123 28.0
38 12.5	123 32.5
38 12.5	123 28.0
38 07.5	123 24.5
38 07.5	123 32.0

38 05.0 123 30.0
38 05.5 123 25.0
38 03.0 123 30.0
38 03.5 123 27.0
38 02.5 123 28.0
38 02.5 123 26.0
38 00.0 123 27.0
38 57.8 123 25.0
38 57.0 123 25.0
38 57.0 123 22.0

(B) Chartlets
(C) Emergency Contact phone number: Sanctuary office in SF - (415)561-6622
(D) RHIB operations may be requested to ferry pilots to and from the mainland.

(E) Table 1. Days on board the McARTHUR. x= on board
Ed Ueber (EU), Dan Howard (DH), Natalie Cosentino (NC), Maria Brown (MB), Jan Roletto (JR), Tom Laidig (TL), Amber Mace (AM), Karina Racz (KR), Peter de Jung (PD)

Date	EU	DH	NC	MB	JR	TL	AM	KR	PD
27	x	x	x	x	x	x			x
28	x	x	x	x	x	x			x
29	x	x	x	x	x	x			x
30	x	x	x	x	x	x			x
1									x
2	x	x	x				x	x	x
3	x	x	x				x	x	x
4	x	x	x				x	x	x
5	x	x	x				x	x	x
6	x	x	x				x	x	x

Peter de Jung (Male) - will be on board the whole cruise conducting nighttime plankton operations

Table 2. Pilots dive days. L= Launch and recovery exercise x= dive day. April 19 is the SSE contingency day, I will insert Kip here as place holder and priority if available. April 22nd is earth day media event. April 26 is the student summit in Bodega Bay.

Date	EU	DH	JR	TL	NC	MB	AM	KR
27	x				L			
28		x	x	x				
29	x	x			x			
30			x	x	x			
1								
2						x	x	
3								x
4	*							
5	*							
6	*							

May 4 and 5 are SSE days and the 6th is SSE contingency day in port

_____ _____ _____ _____

John C. Albright Date Sylvia Earle Date
Rear Admiral, NOAA Chief Scientist
Director, Pacific Marine Center Sustainable Seas Expedition

_____ _____

Daniel F. Howard Date
Mission Coordinator
CBNMS